Amendments to the Claims

Please cancel claims 1- 51 and add new claims 52 - 219.

1 – 51. (cancelled)

52. (new) A heterologous fusion protein comprising a hyperglycosylated G-CSF analog fused to a polypeptide selected from the group consisting of

a) human albumin;

b) human albumin analogs; and

c) fragments of human albumin.

53. (new) The heterologous fusion protein of Claim 52, wherein the hyperglycosylated G-CSF analog is fused to the polypeptide via a peptide linker.

54. (new) The heterologous fusion protein of Claim 53 wherein the peptide linker is selected from the group consisting of:

a) a glycine rich peptide;

b) a peptide having the sequence $[Gly\text{-}Gly\text{-}Gly\text{-}Gly\text{-}Ser]_n$ where n is 1, 2, 3, 4, or 5; and

c) a peptide having the sequence $[Gly\text{-}Gly\text{-}Gly\text{-}Gly\text{-}Ser]_3$.

55. (new) The heterologous fusion protein of Claim 52 wherein the hyperglycosylated G-CSF analog comprises the amino acid sequence of the formula I: [SEQ ID NO: 1]

```
1               5                   10                  15
Thr Pro Leu Gly Pro Ala Ser Ser Leu Pro Gln Ser Phe Leu Leu Lys
            20                  25                  30
Xaa Leu Glu Gln Val Arg Lys Ile Gln Gly Asp Gly Ala Ala Leu Gln
        35                  40                  45
Glu Lys Leu Cys Xaa Xaa Xaa Lys Leu Cys His Pro Glu Glu Leu Val
    50                  55                  60
Leu Leu Gly His Ser Leu Gly Ile Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
65                  70                  75                  80
Xaa Xaa Xaa Xaa Xaa Gln Leu Ala Gly Cys Leu Ser Gln Leu His Ser
                85                  90                  95
Gly Leu Phe Leu Tyr Gln Gly Leu Leu Gln Ala Leu Xaa Xaa Xaa Ser
            100                 105                 110
Xaa Glu Leu Gly Pro Thr Leu Asp Thr Leu Gln Leu Asp Val Ala Asp
        115                 120                 125
Phe Ala Thr Thr Ile Trp Gln Gln Met Glu Glu Leu Gly Met Ala Pro
    130                 135                 140
Ala Leu Gln Pro Xaa Xaa Xaa Ala Met Pro Ala Phe Xaa Xaa Xaa Phe
145                 150                 155                 160
Gln Arg Arg Ala Gly Gly Val Leu Val Ala Ser His Leu Aln Ser Phe
                165                 170
Leu Glu Val Ser Tyr Arg Val Leu Arg His Leu Ala Gln Pro      (I)
```

wherein:

Xaa at position 17 is Cys, Ala, Leu, Ser, or Glu;

Xaa at position 37 is Ala or Asn;

Xaa at position 38 is Thr, or any other amino acid except Pro;

Xaa at position 39 is Tyr, Thr, or Ser;

Xaa at position 57 is Pro or Val;

Xaa at position 58 is Trp or Asn;

Xaa at position 59 is Ala or any other amino acid except Pro;

Xaa at position 60 is Pro, Thr, Asn, or Ser,

Xaa at position 61 is Leu, or any other amino acid except Pro;

Xaa at position 62 is Ser or Thr;

Xaa at position 63 is Ser or Asn;

Xaa at position 64 is Cys or any other amino acid except Pro;

Xaa at position 65 is Pro, Ser, or Thr;

Xaa at position 66 is Ser or Thr;

Xaa at position 67 is Gln or Asn;

Xaa at position 68 is Ala or any other amino acid except Pro;

Xaa at position 69 is Leu, Thr, or Ser

Xaa at position 93 is Glu or Asn

Xaa at position 94 is Gly or any other amino acid except Pro;

Xaa at position 95 is Ile, Asn, Ser, or Thr;

Xaa at position 97 is Pro, Ser, Thr, or Asn;

Xaa at position 133 is Thr or Asn;

Xaa at position 134 is Gln or any other amino acid except Pro;

Xaa at position 135 is Gly, Ser, or Thr

Xaa at position 141 is Ala or Asn;

Xaa at position 142 is Ser or any other amino acid except Pro; and

Xaa at position 143 is Ala, Ser, or Thr;

56. (new) The heterologous fusion protein of Claim 53 wherein the hyperglycosylated G-CSF analog comprises the amino acid sequence of the formula I: [SEQ ID NO: 1]

```
1               5                   10                  15
Thr Pro Leu Gly Pro Ala Ser Ser Leu Pro Gln Ser Phe Leu Leu Lys
            20                  25                  30
Xaa Leu Glu Gln Val Arg Lys Ile Gln Gly Asp Gly Ala Ala Leu Gln
        35                  40                  45
Glu Lys Leu Cys Xaa Xaa Xaa Lys Leu Cys His Pro Glu Glu Leu Val
    50                  55                  60
Leu Leu Gly His Ser Leu Gly Ile Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
65                  70                  75                  80
Xaa Xaa Xaa Xaa Xaa Gln Leu Ala Gly Cys Leu Ser Gln Leu His Ser
                85                  90                  95
Gly Leu Phe Leu Tyr Gln Gly Leu Leu Gln Ala Leu Xaa Xaa Xaa Ser
```

```
            100                 105                 110
Xaa Glu Leu Gly Pro Thr Leu Asp Thr Leu Gln Leu Asp Val Ala Asp
        115                 120                 125
Phe Ala Thr Thr Ile Trp Gln Gln Met Glu Glu Leu Gly Met Ala Pro
    130                 135                 140
Ala Leu Gln Pro Xaa Xaa Xaa Ala Met Pro Ala Phe Xaa Xaa Xaa Phe
145                 150                 155                 160
Gln Arg Arg Ala Gly Gly Val Leu Val Ala Ser His Leu Aln Ser Phe
                165                 170
Leu Glu Val Ser Tyr Arg Val Leu Arg His Leu Ala Gln Pro      (I)
```

wherein:

Xaa at position 17 is Cys, Ala, Leu, Ser, or Glu;

Xaa at position 37 is Ala or Asn;

Xaa at position 38 is Thr, or any other amino acid except Pro;

Xaa at position 39 is Tyr, Thr, or Ser;

Xaa at position 57 is Pro or Val;

Xaa at position 58 is Trp or Asn;

Xaa at position 59 is Ala or any other amino acid except Pro;

Xaa at position 60 is Pro, Thr, Asn, or Ser,

Xaa at position 61 is Leu, or any other amino acid except Pro;

Xaa at position 62 is Ser or Thr;

Xaa at position 63 is Ser or Asn;

Xaa at position 64 is Cys or any other amino acid except Pro;

Xaa at position 65 is Pro, Ser, or Thr;

Xaa at position 66 is Ser or Thr;

Xaa at position 67 is Gln or Asn;

Xaa at position 68 is Ala or any other amino acid except Pro;

Xaa at position 69 is Leu, Thr, or Ser

Xaa at position 93 is Glu or Asn

Xaa at position 94 is Gly or any other amino acid except Pro;

Xaa at position 95 is Ile, Asn, Ser, or Thr;

Xaa at position 97 is Pro, Ser, Thr, or Asn;

Xaa at position 133 is Thr or Asn;

Xaa at position 134 is Gln or any other amino acid except Pro;

Xaa at position 135 is Gly, Ser, or Thr

Xaa at position 141 is Ala or Asn;

Xaa at position 142 is Ser or any other amino acid except Pro; and

Xaa at position 143 is Ala, Ser, or Thr;

57. (new) The heterologous fusion protein of Claim 54 wherein the hyperglycosylated G-CSF analog comprises the amino acid sequence of the formula I: [SEQ ID NO: 1]

```
1               5                   10                  15
Thr Pro Leu Gly Pro Ala Ser Ser Leu Pro Gln Ser Phe Leu Leu Lys
            20                  25                  30
Xaa Leu Glu Gln Val Arg Lys Ile Gln Gly Asp Gly Ala Ala Leu Gln
        35                  40                  45
Glu Lys Leu Cys Xaa Xaa Xaa Lys Leu Cys His Pro Glu Glu Leu Val
    50                  55                  60
Leu Leu Gly His Ser Leu Gly Ile Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
65                  70                  75                  80
Xaa Xaa Xaa Xaa Xaa Gln Leu Ala Gly Cys Leu Ser Gln Leu His Ser
                85                  90                  95
Gly Leu Phe Leu Tyr Gln Gly Leu Leu Gln Ala Leu Xaa Xaa Xaa Ser
            100                 105                 110
Xaa Glu Leu Gly Pro Thr Leu Asp Thr Leu Gln Leu Asp Val Ala Asp
        115                 120                 125
Phe Ala Thr Thr Ile Trp Gln Gln Met Glu Glu Leu Gly Met Ala Pro
    130                 135                 140
Ala Leu Gln Pro Xaa Xaa Xaa Ala Met Pro Ala Phe Xaa Xaa Xaa Phe
145                 150                 155                 160
Gln Arg Arg Ala Gly Gly Val Leu Val Ala Ser His Leu Aln Ser Phe
                165                 170
Leu Glu Val Ser Tyr Arg Val Leu Arg His Leu Ala Gln Pro      (I)
```

wherein:

Xaa at position 17 is Cys, Ala, Leu, Ser, or Glu;

Xaa at position 37 is Ala or Asn;

Xaa at position 38 is Thr, or any other amino acid except Pro;

Xaa at position 39 is Tyr, Thr, or Ser;

Xaa at position 57 is Pro or Val;

Xaa at position 58 is Trp or Asn;

Xaa at position 59 is Ala or any other amino acid except Pro;

Xaa at position 60 is Pro, Thr, Asn, or Ser,

Xaa at position 61 is Leu, or any other amino acid except Pro;

Xaa at position 62 is Ser or Thr;

Xaa at position 63 is Ser or Asn;

Xaa at position 64 is Cys or any other amino acid except Pro;

Xaa at position 65 is Pro, Ser, or Thr;

Xaa at position 66 is Ser or Thr;

Xaa at position 67 is Gln or Asn;

Xaa at position 68 is Ala or any other amino acid except Pro;

Xaa at position 69 is Leu, Thr, or Ser

Xaa at position 93 is Glu or Asn

Xaa at position 94 is Gly or any other amino acid except Pro;

Xaa at position 95 is Ile, Asn, Ser, or Thr;

Xaa at position 97 is Pro, Ser, Thr, or Asn;

Xaa at position 133 is Thr or Asn;

Xaa at position 134 is Gln or any other amino acid except Pro;

Xaa at position 135 is Gly, Ser, or Thr
Xaa at position 141 is Ala or Asn;
Xaa at position 142 is Ser or any other amino acid except Pro; and
Xaa at position 143 is Ala, Ser, or Thr;

58. (new) The heterologous fusion protein of Claim 53 wherein any two regions of regions 1 through 14 comprise the sequence Asn Xaa1 Xaa2 wherein Xaa1 is any amino acid except Pro and Xaa2 is Ser or Thr.

59. (new) The heterologous fusion protein of Claim 53 wherein any three regions of regions 1 through 14 comprise the sequence Asn Xaa1 Xaa2 wherein Xaa1 is any amino acid except Pro and Xaa2 is Ser or Thr.

60. (new) The heterologous fusion protein of Claim 53 wherein any four regions of regions 1 through 14 comprise the sequence Asn Xaa1 Xaa2 wherein Xaa1 is any amino acid except Pro and Xaa2 is Ser or Thr.

61. (new) The heterologous fusion protein of Claim 53 wherein the hyperglycosylated G-CSF analog is selected from the group consisting of:
a) G-CSF[A37N,Y39T]
b) G-CSF[P57V,W58N,P60T]
c) G-CSF[P60N,S62T]
d) G-CSF[S63N,P65T]
e) G-CSF[Q67N,L69T]
f) G-CSF[E93N,I95T]
g) G-CSF[T133N,G135T]
h) G-CSF[A141N,A143T]
i) G-CSF[A37N,Y39T,P57V,W58N,P60T]
j) G-CSF[A37N,Y39T,P60N,S62T]
k) G-CSF[A37N,Y39T,S63N,P65T]
l) G-CSF[A37N,Y39T,Q67N,L69T]
m) G-CSF[A37N,Y39T,E93N,I95T]
n) G-CSF[A37N,Y39T,T133N,G135T]
o) G-CSF[A37N,Y39T,A141N,A143T]
p) G-CSF[A37N,Y39T,P57V,W58N,P60T,S63N,P65T]
q) G-CSF[A37N,Y39T,P57V,W58N,P60T,Q67N,L69T]
r) G-CSF[A37N,Y39T,S63N,P65T,E93N,I95T]

62. (new) The heterologous fusion protein of Claim 56 wherein any two regions of regions 1 through 14 comprise the sequence Asn Xaa1 Xaa2 wherein Xaa1 is any amino acid except Pro and Xaa2 is Ser or Thr.

63. (new) The heterologous fusion protein of Claim 56 wherein any three regions of regions 1 through 14 comprise the sequence Asn Xaa1 Xaa2 wherein Xaa1 is any amino acid except Pro and Xaa2 is Ser or Thr.

64. (new) The heterologous fusion protein of Claim 56 wherein any four regions of regions 1 through 14 comprise the sequence Asn Xaa1 Xaa2 wherein Xaa1 is any amino acid except Pro and Xaa2 is Ser or Thr.

65. (new) The heterologous fusion protein of Claim 56 wherein the hyperglycosylated G-CSF analog is selected from the group consisting of:
a) G-CSF[A37N,Y39T]
b) G-CSF[P57V,W58N,P60T]
c) G-CSF[P60N,S62T]
d) G-CSF[S63N,P65T]
e) G-CSF[Q67N,L69T]
f) G-CSF[E93N,I95T]
g) G-CSF[T133N,G135T]
h) G-CSF[A141N,A143T]
i) G-CSF[A37N,Y39T,P57V,W58N,P60T]
j) G-CSF[A37N,Y39T,P60N,S62T]
k) G-CSF[A37N,Y39T,S63N,P65T]
l) G-CSF[A37N,Y39T,Q67N,L69T]
m) G-CSF[A37N,Y39T,E93N,I95T]
n) G-CSF[A37N,Y39T,T133N,G135T]
o) G-CSF[A37N,Y39T,A141N,A143T]
p) G-CSF[A37N,Y39T,P57V,W58N,P60T,S63N,P65T]
q) G-CSF[A37N,Y39T,P57V,W58N,P60T,Q67N,L69T]
r) G-CSF[A37N,Y39T,S63N,P65T,E93N,I95T]

66. (new) The heterologous fusion protein of Claim 57 wherein any two regions of regions 1 through 14 comprise the sequence Asn Xaa1 Xaa2 wherein Xaa1 is any amino acid except Pro and Xaa2 is Ser or Thr.

67. (new) The heterologous fusion protein of Claim 57 wherein any three regions of regions 1 through 14 comprise the sequence Asn Xaa1 Xaa2 wherein Xaa1 is any amino acid except Pro and Xaa2 is Ser or Thr.

68. (new) The heterologous fusion protein of Claim 57 wherein any four regions of regions 1 through 14 comprise the sequence Asn Xaa1 Xaa2 wherein Xaa1 is any amino acid except Pro and Xaa2 is Ser or Thr.

69. (new) The heterologous fusion protein of Claim 57 wherein the hyperglycosylated G-CSF analog is selected from the group consisting of:
a) G-CSF[A37N,Y39T]
b) G-CSF[P57V,W58N,P60T]
c) G-CSF[P60N,S62T]
d) G-CSF[S63N,P65T]
e) G-CSF[Q67N,L69T]
f) G-CSF[E93N,I95T]
g) G-CSF[T133N,G135T]
h) G-CSF[A141N,A143T]
i) G-CSF[A37N,Y39T,P57V,W58N,P60T]
j) G-CSF[A37N,Y39T,P60N,S62T]
k) G-CSF[A37N,Y39T,S63N,P65T]
l) G-CSF[A37N,Y39T,Q67N,L69T]
m) G-CSF[A37N,Y39T,E93N,I95T]
n) G-CSF[A37N,Y39T,T133N,G135T]
o) G-CSF[A37N,Y39T,A141N,A143T]
p) G-CSF[A37N,Y39T,P57V,W58N,P60T,S63N,P65T]
q) G-CSF[A37N,Y39T,P57V,W58N,P60T,Q67N,L69T]
r) G-CSF[A37N,Y39T,S63N,P65T,E93N,I95T]

70. (new) The heterologous fusion protein of claim 61, wherein the hyperglycosylated G-CSF analog is G-CSF[A37N, Y39T,P57V,W58N,P60T,Q67N,L69T].

71. (new) The heterologous fusion protein of claim 65, wherein the hyperglycosylated G-CSF analog is G-CSF[A37N, Y39T,P57V,W58N,P60T,Q67N,L69T].

72. (new) The heterologous fusion protein of claim 69, wherein the hyperglycosylated G-CSF analog is G-CSF[A37N, Y39T,P57V,W58N,P60T,Q67N,L69T].

73. (new) The heterologous fusion protein of claim 61, wherein the hyperglycosylated G-CSF analog is G-CSF[A37N,Y39T,S63N,P65T,E93N,I95T].

74. (new) The heterologous fusion protein of claim 65, wherein the hyperglycosylated G-CSF analog is G-CSF[A37N,Y39T,S63N,P65T,E93N,I95T].

75. (new) The heterologous fusion protein of claim 69, wherein the hyperglycosylated G-CSF analog is G-CSF[A37N,Y39T,S63N,P65T,E93N,I95T].

76. (new) A heterologous fusion protein which is the product of the expression in a host cell of an exogenous DNA sequence which comprises a DNA sequence encoding a heterologous fusion protein of Claim 52.

77. (new) A heterologous fusion protein which is the product of the expression in a host cell of an exogenous DNA sequence which comprises a DNA sequence encoding a heterologous fusion protein of Claim 55.

78. (new) A heterologous fusion protein which is the product of the expression in a host cell of an exogenous DNA sequence which comprises a DNA sequence encoding a heterologous fusion protein of Claim 56.

79. (new) A polynucleotide encoding a heterologous fusion protein of Claim 52.

80. (new) A polynucleotide encoding a heterologous fusion protein of Claim 53.

81. (new) A polynucleotide encoding a heterologous fusion protein of Claim 55.

82. (new) A polynucleotide encoding a heterologous fusion protein of Claim 56.

83. (new) A polynucleotide encoding a heterologous fusion protein of Claim 57.

84. (new) A polynucleotide which comprises a DNA sequence selected from the group consisting of:
a) SEQ ID NO:2
b) SEQ ID NO:3
c) SEQ ID NO:4
d) SEQ ID NO:5
e) SEQ ID NO:6
f) SEQ ID NO:7
g) SEQ ID NO:8
h) SEQ ID NO:9

i) SEQ ID NO:10
j) SEQ ID NO:11
k) SEQ ID NO:12
l) SEQ ID NO:13
m) SEQ ID NO:14
n) SEQ ID NO:15
o) SEQ ID NO:16 or
p) SEQ ID NO:17,

85. (new) The polynucleotide of Claim 84, wherein the DNA fused in-frame comprises SEQ ID NO: 17.

86. (new) The heterologous fusion protein of Claim 52 wherein the polypeptide is human albumin.

87. (new) The heterologous fusion protein of Claim 53 wherein the polypeptide is human albumin.

88. (new) The heterologous fusion protein of Claim 52 wherein the polypeptide is an N-terminal fragment of albumin.

89. (new) The heterologous fusion protein of Claim 53 wherein the polypeptide is an N-terminal fragment of albumin.

90. (new) A method for increasing neutrophil levels in a mammal comprising administering a therapeutically effective amount of the heterologous fusion protein of Claim 52.

91. (new) A method for increasing neutrophil levels in a mammal comprising administering a therapeutically effective amount of the heterologous fusion protein of Claim 53.

92. (new) A method for increasing neutrophil levels in a mammal comprising administering a therapeutically effective amount of the heterologous fusion protein of Claim 55.

93. (new) A method for increasing neutrophil levels in a mammal comprising administering a therapeutically effective amount of the heterologous fusion protein of Claim 56.

94. (new) A method for increasing neutrophil levels in a mammal comprising administering a therapeutically effective amount of the heterologous fusion protein of Claim 61.

95. (new) A method for increasing neutrophil levels in a mammal comprising administering a therapeutically effective amount of the heterologous fusion protein of Claim 70.

96. (new) A method for increasing neutrophil levels in a mammal comprising administering a therapeutically effective amount of the heterologous fusion protein of Claim 73.

97. (new) A method for increasing neutrophil levels in a mammal comprising administering a therapeutically effective amount of the heterologous fusion protein of Claim 86.

98. (new) A method for increasing neutrophil levels in a mammal comprising administering a therapeutically effective amount of the heterologous fusion protein of Claim 88.

99. (new) A method of treating a patient with insufficient circulating neutrophil levels comprising administering to a patient in need thereof, an effective amount of a heterologous fusion protein of Claim 52.

100. (new) A method of treating a patient with insufficient circulating neutrophil levels comprising administering to a patient in need thereof, an effective amount of a heterologous fusion protein of Claim 53.

101. (new) A method of treating a patient with insufficient circulating neutrophil levels comprising administering to a patient in need thereof, an effective amount of a heterologous fusion protein of Claim 55.

102. (new) A method of treating a patient with insufficient circulating neutrophil levels comprising administering to a patient in need thereof, an effective amount of a heterologous fusion protein of Claim 56.

103. (new) A method of treating a patient with insufficient circulating neutrophil levels comprising administering to a patient in need thereof, an effective amount of a heterologous fusion protein of Claim 61.

104. (new) A method of treating a patient with insufficient circulating neutrophil levels comprising administering to a patient in need thereof, an effective amount of a heterologous fusion protein of Claim 70.

105. (new) A method of treating a patient with insufficient circulating neutrophil levels comprising administering to a patient in need thereof, an effective amount of a heterologous fusion protein of Claim 73.

106. (new) A method of treating a patient with insufficient circulating neutrophil levels comprising administering to a patient in need thereof, an effective amount of a heterologous fusion protein of Claim 86.

107. (new) A method of treating a patient with insufficient circulating neutrophil levels comprising administering to a patient in need thereof, an effective amount of a heterologous fusion protein of Claim 88.

108. (new) A pharmaceutical formulation adapted for the treatment of patients with insufficient neutrophil levels comprising a heterologous fusion protein of Claim 52.

109. (new) A pharmaceutical formulation adapted for the treatment of patients with insufficient neutrophil levels comprising a heterologous fusion protein of Claim 53.

110. (new) A pharmaceutical formulation adapted for the treatment of patients with insufficient neutrophil levels comprising a heterologous fusion protein of Claim 55.

111. (new) A pharmaceutical formulation adapted for the treatment of patients with insufficient neutrophil levels comprising a heterologous fusion protein of Claim 56.

112. (new) A pharmaceutical formulation adapted for the treatment of patients with insufficient neutrophil levels comprising a heterologous fusion protein of Claim 61.

113. (new) A pharmaceutical formulation adapted for the treatment of patients with insufficient neutrophil levels comprising a heterologous fusion protein of Claim 70.

114. (new) A pharmaceutical formulation adapted for the treatment of patients with insufficient neutrophil levels comprising a heterologous fusion protein of Claim 73.

115. (new) A pharmaceutical formulation adapted for the treatment of patients with insufficient neutrophil levels comprising a heterologous fusion protein of Claim 86.

116. (new) A pharmaceutical formulation adapted for the treatment of patients with insufficient neutrophil levels comprising a heterologous fusion protein of Claim 88.

117. (new) A heterologous fusion protein comprising a hyperglycosylated G-CSF analog fused to a polypeptide selected from the group consisting of:

a) the Fc portion of an immunoglobulin;
b) an analog of the Fc portion of an immunoglobulin; and
c) fragments of the Fc portion of an immunoglobulin.

118. (new) The heterologous fusion protein of Claim 117, wherein the hyperglycosylated G-CSF analog is fused to the polypeptide via a peptide linker.

119. (new) The heterologous fusion protein of the Claim 118 wherein the peptide linker is selected from the group consisting of:

a) a glycine rich peptide;
b) a peptide having the sequence $[Gly\text{-}Gly\text{-}Gly\text{-}Gly\text{-}Ser]_n$ where n is 1, 2, 3, 4, or 5; and
c) a peptide having the sequence $[Gly\text{-}Gly\text{-}Gly\text{-}Gly\text{-}Ser]_3$.

120. (new) The heterologous fusion protein of Claim 117, wherein the hyperglycosylated G-CSF analog comprises the amino acid sequence of the formula I: [SEQ ID NO: 1]

```
1               5                   10                  15
Thr Pro Leu Gly Pro Ala Ser Ser Leu Pro Gln Ser Phe Leu Leu Lys
            20                  25                  30
Xaa Leu Glu Gln Val Arg Lys Ile Gln Gly Asp Gly Ala Ala Leu Gln
        35                  40                  45
Glu Lys Leu Cys Xaa Xaa Xaa Lys Leu Cys His Pro Glu Glu Leu Val
    50                  55                  60
Leu Leu Gly His Ser Leu Gly Ile Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
65                  70                  75                  80
Xaa Xaa Xaa Xaa Xaa Gln Leu Ala Gly Cys Leu Ser Gln Leu His Ser
                85                  90                  95
Gly Leu Phe Leu Tyr Gln Gly Leu Leu Gln Ala Leu Xaa Xaa Xaa Ser
            100                 105                 110
Xaa Glu Leu Gly Pro Thr Leu Asp Thr Leu Gln Leu Asp Val Ala Asp
        115                 120                 125
Phe Ala Thr Thr Ile Trp Gln Gln Met Glu Glu Leu Gly Met Ala Pro
    130                 135                 140
Ala Leu Gln Pro Xaa Xaa Xaa Ala Met Pro Ala Phe Xaa Xaa Xaa Phe
145                 150                 155                 160
Gln Arg Arg Ala Gly Gly Val Leu Val Ala Ser His Leu Aln Ser Phe
```

```
                165                 170
Leu Glu Val Ser Tyr Arg Val Leu Arg His Leu Ala Gln Pro     (I)
```

wherein:

Xaa at position 17 is Cys, Ala, Leu, Ser, or Glu;

Xaa at position 37 is Ala or Asn;

Xaa at position 38 is Thr, or any other amino acid except Pro;

Xaa at position 39 is Tyr, Thr, or Ser;

Xaa at position 57 is Pro or Val;

Xaa at position 58 is Trp or Asn;

Xaa at position 59 is Ala or any other amino acid except Pro;

Xaa at position 60 is Pro, Thr, Asn, or Ser,

Xaa at position 61 is Leu, or any other amino acid except Pro;

Xaa at position 62 is Ser or Thr;

Xaa at position 63 is Ser or Asn;

Xaa at position 64 is Cys or any other amino acid except Pro;

Xaa at position 65 is Pro, Ser, or Thr;

Xaa at position 66 is Ser or Thr;

Xaa at position 67 is Gln or Asn;

Xaa at position 68 is Ala or any other amino acid except Pro;

Xaa at position 69 is Leu, Thr, or Ser

Xaa at position 93 is Glu or Asn

Xaa at position 94 is Gly or any other amino acid except Pro;

Xaa at position 95 is Ile, Asn, Ser, or Thr;

Xaa at position 97 is Pro, Ser, Thr, or Asn;

Xaa at position 133 is Thr or Asn;

Xaa at position 134 is Gln or any other amino acid except Pro;

Xaa at position 135 is Gly, Ser, or Thr

Xaa at position 141 is Ala or Asn;

Xaa at position 142 is Ser or any other amino acid except Pro; and

Xaa at position 143 is Ala, Ser, or Thr;

121. (new) The heterologous fusion protein of Claim 118, wherein the hyperglycosylated G-CSF analog comprises the amino acid sequence of the formula I: [SEQ ID NO: 1]

```
1               5                   10                  15
Thr Pro Leu Gly Pro Ala Ser Ser Leu Pro Gln Ser Phe Leu Leu Lys
            20                  25                  30
Xaa Leu Glu Gln Val Arg Lys Ile Gln Gly Asp Gly Ala Ala Leu Gln
        35                  40                  45
Glu Lys Leu Cys Xaa Xaa Xaa Lys Leu Cys His Pro Glu Glu Leu Val
    50                  55                  60
Leu Leu Gly His Ser Leu Gly Ile Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
65                  70                  75                  80
Xaa Xaa Xaa Xaa Xaa Gln Leu Ala Gly Cys Leu Ser Gln Leu His Ser
```

```
                  85                  90                  95
Gly Leu Phe Leu Tyr Gln Gly Leu Leu Gln Ala Leu Xaa Xaa Xaa Ser
            100                 105                 110
Xaa Glu Leu Gly Pro Thr Leu Asp Thr Leu Gln Leu Asp Val Ala Asp
        115                 120                 125
Phe Ala Thr Thr Ile Trp Gln Gln Met Glu Glu Leu Gly Met Ala Pro
    130                 135                 140
Ala Leu Gln Pro Xaa Xaa Xaa Ala Met Pro Ala Phe Xaa Xaa Xaa Phe
145                 150                 155                 160
Gln Arg Arg Ala Gly Gly Val Leu Val Ala Ser His Leu Aln Ser Phe
                165                 170
Leu Glu Val Ser Tyr Arg Val Leu Arg His Leu Ala Gln Pro      (I)
```

wherein:

Xaa at position 17 is Cys, Ala, Leu, Ser, or Glu;

Xaa at position 37 is Ala or Asn;

Xaa at position 38 is Thr, or any other amino acid except Pro;

Xaa at position 39 is Tyr, Thr, or Ser;

Xaa at position 57 is Pro or Val;

Xaa at position 58 is Trp or Asn;

Xaa at position 59 is Ala or any other amino acid except Pro;

Xaa at position 60 is Pro, Thr, Asn, or Ser,

Xaa at position 61 is Leu, or any other amino acid except Pro;

Xaa at position 62 is Ser or Thr;

Xaa at position 63 is Ser or Asn;

Xaa at position 64 is Cys or any other amino acid except Pro;

Xaa at position 65 is Pro, Ser, or Thr;

Xaa at position 66 is Ser or Thr;

Xaa at position 67 is Gln or Asn;

Xaa at position 68 is Ala or any other amino acid except Pro;

Xaa at position 69 is Leu, Thr, or Ser

Xaa at position 93 is Glu or Asn

Xaa at position 94 is Gly or any other amino acid except Pro;

Xaa at position 95 is Ile, Asn, Ser, or Thr;

Xaa at position 97 is Pro, Ser, Thr, or Asn;

Xaa at position 133 is Thr or Asn;

Xaa at position 134 is Gln or any other amino acid except Pro;

Xaa at position 135 is Gly, Ser, or Thr

Xaa at position 141 is Ala or Asn;

Xaa at position 142 is Ser or any other amino acid except Pro; and

Xaa at position 143 is Ala, Ser, or Thr;

122. (new) The heterologous fusion protein of Claim 119, wherein the hyperglycosylated G-CSF analog comprises the amino acid sequence of the formula I: [SEQ ID NO: 1]

```
1               5                   10                  15
Thr Pro Leu Gly Pro Ala Ser Ser Leu Pro Gln Ser Phe Leu Leu Lys
            20                  25                  30
Xaa Leu Glu Gln Val Arg Lys Ile Gln Gly Asp Gly Ala Ala Leu Gln
        35                  40                  45
Glu Lys Leu Cys Xaa Xaa Xaa Lys Leu Cys His Pro Glu Glu Leu Val
    50                  55                  60
Leu Leu Gly His Ser Leu Gly Ile Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
65                  70                  75                  80
Xaa Xaa Xaa Xaa Xaa Gln Leu Ala Gly Cys Leu Ser Gln Leu His Ser
                85                  90                  95
Gly Leu Phe Leu Tyr Gln Gly Leu Leu Gln Ala Leu Xaa Xaa Xaa Ser
            100                 105                 110
Xaa Glu Leu Gly Pro Thr Leu Asp Thr Leu Gln Leu Asp Val Ala Asp
        115                 120                 125
Phe Ala Thr Thr Ile Trp Gln Gln Met Glu Glu Leu Gly Met Ala Pro
    130                 135                 140
Ala Leu Gln Pro Xaa Xaa Xaa Ala Met Pro Ala Phe Xaa Xaa Xaa Phe
145                 150                 155                 160
Gln Arg Arg Ala Gly Gly Val Leu Val Ala Ser His Leu Aln Ser Phe
                165                 170
Leu Glu Val Ser Tyr Arg Val Leu Arg His Leu Ala Gln Pro      (I)
```

wherein:

Xaa at position 17 is Cys, Ala, Leu, Ser, or Glu;

Xaa at position 37 is Ala or Asn;

Xaa at position 38 is Thr, or any other amino acid except Pro;

Xaa at position 39 is Tyr, Thr, or Ser;

Xaa at position 57 is Pro or Val;

Xaa at position 58 is Trp or Asn;

Xaa at position 59 is Ala or any other amino acid except Pro;

Xaa at position 60 is Pro, Thr, Asn, or Ser,

Xaa at position 61 is Leu, or any other amino acid except Pro;

Xaa at position 62 is Ser or Thr;

Xaa at position 63 is Ser or Asn;

Xaa at position 64 is Cys or any other amino acid except Pro;

Xaa at position 65 is Pro, Ser, or Thr;

Xaa at position 66 is Ser or Thr;

Xaa at position 67 is Gln or Asn;

Xaa at position 68 is Ala or any other amino acid except Pro;

Xaa at position 69 is Leu, Thr, or Ser

Xaa at position 93 is Glu or Asn

Xaa at position 94 is Gly or any other amino acid except Pro;

Xaa at position 95 is Ile, Asn, Ser, or Thr;

Xaa at position 97 is Pro, Ser, Thr, or Asn;

Xaa at position 133 is Thr or Asn;
Xaa at position 134 is Gln or any other amino acid except Pro;
Xaa at position 135 is Gly, Ser, or Thr
Xaa at position 141 is Ala or Asn;
Xaa at position 142 is Ser or any other amino acid except Pro; and
Xaa at position 143 is Ala, Ser, or Thr;

123. (new) The heterologous fusion protein of Claim 120 wherein any two regions of regions 1 through 14 comprise the sequence Asn Xaa1 Xaa2 wherein Xaa1 is any amino acid except Pro and Xaa2 is Ser or Thr.

124. (new) The heterologous fusion protein of Claim 120 wherein any three regions of regions 1 through 14 comprise the sequence Asn Xaa1 Xaa2 wherein Xaa1 is any amino acid except Pro and Xaa2 is Ser or Thr.

125. (new) The heterologous fusion protein of Claim 120 wherein any four regions of regions 1 through 14 comprise the sequence Asn Xaa1 Xaa2 wherein Xaa1 is any amino acid except Pro and Xaa2 is Ser or Thr.

126. (new) The heterologous fusion protein of Claim 120 wherein the hyperglycosylated G-CSF analog is selected from the group consisting of:
a) G-CSF[A37N,Y39T]
b) G-CSF[P57V,W58N,P60T]
c) G-CSF[P60N,S62T]
d) G-CSF[S63N,P65T]
e) G-CSF[Q67N,L69T]
f) G-CSF[E93N,I95T]
g) G-CSF[T133N,G135T]
h) G-CSF[A141N,A143T]
i) G-CSF[A37N,Y39T,P57V,W58N,P60T]
j) G-CSF[A37N,Y39T,P60N,S62T]
k) G-CSF[A37N,Y39T,S63N,P65T]
l) G-CSF[A37N,Y39T,Q67N,L69T]
m) G-CSF[A37N,Y39T,E93N,I95T]
n) G-CSF[A37N,Y39T,T133N,G135T]
o) G-CSF[A37N,Y39T,A141N,A143T]
p) G-CSF[A37N,Y39T,P57V,W58N,P60T,S63N,P65T]
q) G-CSF[A37N,Y39T,P57V,W58N,P60T,Q67N,L69T]
r) G-CSF[A37N,Y39T,S63N,P65T,E93N,I95T]

127. (new) The heterologous fusion protein of Claim 121 wherein any two regions of regions 1 through 14 comprise the sequence Asn Xaa1 Xaa2 wherein Xaa1 is any amino acid except Pro and Xaa2 is Ser or Thr.

128. (new) The heterologous fusion protein of Claim 121 wherein any three regions of regions 1 through 14 comprise the sequence Asn Xaa1 Xaa2 wherein Xaa1 is any amino acid except Pro and Xaa2 is Ser or Thr.

129. (new) The heterologous fusion protein of Claim 121 wherein any four regions of regions 1 through 14 comprise the sequence Asn Xaa1 Xaa2 wherein Xaa1 is any amino acid except Pro and Xaa2 is Ser or Thr.

130. (new) The heterologous fusion protein of Claim 121 wherein the hyperglycosylated G-CSF analog is selected from the group consisting of:
a) G-CSF[A37N,Y39T]
b) G-CSF[P57V,W58N,P60T]
c) G-CSF[P60N,S62T]
d) G-CSF[S63N,P65T]
e) G-CSF[Q67N,L69T]
f) G-CSF[E93N,I95T]
g) G-CSF[T133N,G135T]
h) G-CSF[A141N,A143T]
i) G-CSF[A37N,Y39T,P57V,W58N,P60T]
j) G-CSF[A37N,Y39T,P60N,S62T]
k) G-CSF[A37N,Y39T,S63N,P65T]
l) G-CSF[A37N,Y39T,Q67N,L69T]
m) G-CSF[A37N,Y39T,E93N,I95T]
n) G-CSF[A37N,Y39T,T133N,G135T]
o) G-CSF[A37N,Y39T,A141N,A143T]
p) G-CSF[A37N,Y39T,P57V,W58N,P60T,S63N,P65T]
q) G-CSF[A37N,Y39T,P57V,W58N,P60T,Q67N,L69T]
r) G-CSF[A37N,Y39T,S63N,P65T,E93N,I95T]

131. (new) The heterologous fusion protein of Claim 122 wherein any two regions of regions 1 through 14 comprise the sequence Asn Xaa1 Xaa2 wherein Xaa1 is any amino acid except Pro and Xaa2 is Ser or Thr.

132. (new) The heterologous fusion protein of Claim 122 wherein any three regions of regions 1 through 14 comprise the sequence Asn Xaa1 Xaa2 wherein Xaa1 is any amino acid except Pro and Xaa2 is Ser or Thr.

133. (new) The heterologous fusion protein of Claim 122 wherein any four regions of regions 1 through 14 comprise the sequence Asn Xaa1 Xaa2 wherein Xaa1 is any amino acid except Pro and Xaa2 is Ser or Thr.

134. (new) The heterologous fusion protein of Claim 122 wherein the hyperglycosylated G-CSF analog is selected from the group consisting of:
a) G-CSF[A37N,Y39T]
b) G-CSF[P57V,W58N,P60T]
c) G-CSF[P60N,S62T]
d) G-CSF[S63N,P65T]
e) G-CSF[Q67N,L69T]
f) G-CSF[E93N,I95T]
g) G-CSF[T133N,G135T]
h) G-CSF[A141N,A143T]
i) G-CSF[A37N,Y39T,P57V,W58N,P60T]
j) G-CSF[A37N,Y39T,P60N,S62T]
k) G-CSF[A37N,Y39T,S63N,P65T]
l) G-CSF[A37N,Y39T,Q67N,L69T]
m) G-CSF[A37N,Y39T,E93N,I95T]
n) G-CSF[A37N,Y39T,T133N,G135T]
o) G-CSF[A37N,Y39T,A141N,A143T]
p) G-CSF[A37N,Y39T,P57V,W58N,P60T,S63N,P65T]
q) G-CSF[A37N,Y39T,P57V,W58N,P60T,Q67N,L69T]
r) G-CSF[A37N,Y39T,S63N,P65T,E93N,I95T]

135. (new) The heterologous fusion protein of Claim 126 wherein the hyperglycosylated G-CSF analog is G-CSF[A37N,Y39T,P57V,W58N,P60T,Q67N,L69T]

136. (new) The heterologous fusion protein of Claim 126 wherein the hyperglycosylated G-CSF analog is G-CSF[A37N,Y39T,S63N,P65T,E93N,I95T]

137. (new) The heterologous fusion protein of Claim 117 wherein the polypeptide is the Fc portion of an Ig selected from the group consisting of: IgG1, IgG2, IgG3, IgG4, IgE, IgA, IgD, or IgM.

138. (new) The heterologous fusion protein of Claim 118 wherein the polypeptide is the Fc portion of an Ig selected from the group consisting of: IgG1, IgG2, IgG3, IgG4, IgE, IgA, IgD, or IgM.

139. (new) The heterologous fusion protein of Claim 137 wherein the polypeptide is the Fc portion of an Ig selected from the group consisting of: IgG1, IgG2, IgG3, and IgG4.

140. (new) The heterologous fusion protein of Claim 138 wherein the polypeptide is the Fc portion of an Ig selected from the group consisting of: IgG1, IgG2, IgG3, and IgG4.

141. (new) The heterologous fusion protein of Claim 139 wherein the polypeptide is the Fc portion of an IgG1 immunoglobulin.

142. (new) The heterologous fusion protein of Claim 140 wherein the polypeptide is the Fc portion of an IgG1 immunoglobulin.

143. (new) The heterologous fusion protein of Claim 139 wherein the polypeptide is the Fc portion of an IgG4
immunoglobulin.

144. (new) The heterologous fusion protein of Claim 142 wherein the polypeptide is the Fc portion of an IgG1 immunoglobulin.

145. (new) The heterologous fusion protein of Claim 117 wherein the Fc portion is a human IgG protein.

146. (new) The heterologous fusion protein of Claim 118 wherein the Fc portion is a human IgG protein.

147. (new) The heterologous fusion protein of Claim 117 wherein the Fc portion comprises hinge, CH2, and CH3 domains.

148. (new) The heterologous fusion protein of Claim 118 wherein the Fc portion comprises hinge, CH2, and CH3 domains.

149. (new) The heterologous fusion protein of Claim 141 wherein the polypeptide has the sequence of SEQ ID NO: 33.

150. (new) The heterologous fusion protein of Claim 142 wherein the polypeptide has the sequence of SEQ ID NO: 33.

151. (new) A polynucleotide encoding a heterologous fusion protein of Claim 141, wherein the polynucleotide comprises SEQ ID NO: 22.

152. (new) A polynucleotide encoding a heterologous fusion protein of Claim 142, wherein the polynucleotide comprises SEQ ID NO: 22.

153. (new) A polynucleotide encoding a heterologous fusion protein of Claim 117.

154. (new) A polynucleotide encoding a heterologous fusion protein of Claim 118.

155. (new) A polynucleotide encoding a heterologous fusion protein of Claim 119.

156. (new) A polynucleotide encoding a heterologous fusion protein of Claim 120.

157. (new) A polynucleotide encoding a heterologous fusion protein of Claim 126.

158. (new) A polynucleotide encoding a heterologous fusion protein of Claim 135.

159. (new) A polynucleotide encoding a heterologous fusion protein of Claim 136.

160. (new) A polynucleotide encoding a heterologous fusion protein of Claim 137.

161. (new) A vector comprising the polynucleotide of Claim 79.

162. (new) A vector comprising the polynucleotide of Claim 80.

163. (new) A vector comprising the polynucleotide of Claim 81.

164. (new) A vector comprising the polynucleotide of Claim 82.

165. (new) A vector comprising the polynucleotide of Claim 83.

166. (new) A vector comprising the polynucleotide of Claim 84.

167. (new) A vector comprising the polynucleotide of Claim 85.

168. (new) A vector comprising the polynucleotide of Claim 151.

169. (new) A vector comprising the polynucleotide of Claim 153.

170. (new) A host cell comprising the vector of Claim 161.

171. (new) A host cell comprising the vector of Claim 162.

172. (new) A host cell comprising the vector of Claim 163.

173. (new) A host cell comprising the vector of Claim 164.

174. (new) A host cell comprising the vector of Claim 165.

175. (new) A host cell comprising the vector of Claim 166.

176. (new) A host cell comprising the vector of Claim 167.

177. (new) A host cell comprising the vector of Claim 168.

178. (new) A host cell comprising the vector of Claim 169.

179. (new) A host cell expressing at least one heterologous fusion protein of Claim 52.

180. (new) A host cell expressing at least one heterologous fusion protein of Claim 53.

181. (new) A host cell expressing at least one heterologous fusion protein of Claim 55.

182. (new) A host cell expressing at least one heterologous fusion protein of Claim 56.

183. (new) A host cell expressing at least one heterologous fusion protein of Claim 61.

184. (new) A host cell expressing at least one heterologous fusion protein of Claim 70.

185. (new) A host cell expressing at least one heterologous fusion protein of Claim 73.

186. (new) A host cell expressing at least one heterologous fusion protein of Claim 86.

187. (new) A host cell expressing at least one heterologous fusion protein of Claim 88.

188. (new) A host cell expressing at least one heterologous fusion protein of Claim 117.

189. (new) A host cell expressing at least one heterologous fusion protein of Claim 118.

190. (new) A host cell expressing at least one heterologous fusion protein of Claim 119.

191. (new) A host cell expressing at least one heterologous fusion protein of Claim 120.

192. (new) A host cell expressing at least one heterologous fusion protein of Claim 126.

193. (new) A host cell expressing at least one heterologous fusion protein of Claim 135.

194. (new) A host cell expressing at least one heterologous fusion protein of Claim 136.

195. (new) A host cell expressing at least one heterologous fusion protein of Claim 137.

196. (new) The host cell of Claim 179 wherein said host cell is a CHO cell.

197. (new) The host cell of Claim 180 wherein said host cell is a CHO cell.

198. (new) The host cell of Claim 181 wherein said host cell is a CHO cell.

199. (new) The host cell of Claim 182 wherein said host cell is a CHO cell.

200. (new) The host cell of Claim 183 wherein said host cell is a CHO cell.

201. (new) The host cell of Claim 184 wherein said host cell is a CHO cell.

202. (new) The host cell of Claim 185 wherein said host cell is a CHO cell.

203. (new) The host cell of Claim 186 wherein said host cell is a CHO cell.

204. (new) The host cell of Claim 187 wherein said host cell is a CHO cell.

205. (new) The host cell of Claim 188 wherein said host cell is a CHO cell.

206. (new) The host cell of Claim 189 wherein said host cell is a CHO cell.

207. (new) The host cell of Claim 190 wherein said host cell is a CHO cell.

208. (new) The host cell of Claim 191 wherein said host cell is a CHO cell.

209. (new) The host cell of Claim 192 wherein said host cell is a CHO cell.

210. (new) The host cell of Claim 193 wherein said host cell is a CHO cell.

211. (new) The host cell of Claim 194 wherein said host cell is a CHO cell.

212. (new) The host cell of Claim 195 wherein said host cell is a CHO cell.

213. (new) A process for producing a heterologous fusion protein comprising the steps of transcribing and translating a polynucleotide of Claim 117 under conditions wherein the heterologous fusion protein is expressed in detectable amounts.

214. (new) A method for increasing neutrophil levels in a mammal comprising the administration of a therapeutically effective amount of the heterologous fusion protein of Claim 124.

215. (new) A method for increasing neutrophil levels in a mammal comprising the administration of a therapeutically effective amount of the heterologous fusion protein of Claim 125.

216. (new) A method for increasing neutrophil levels in a mammal comprising the administration of a therapeutically effective amount of the heterologous fusion protein of Claim 126.

217. (new) A method for increasing neutrophil levels in a mammal comprising the administration of a therapeutically effective amount of the heterologous fusion protein of Claim 137.

218. (new) Use of a heterologous fusion protein of Claim 117 for the treatment of patients with insufficient circulating neutrophil levels.

219. (new) A pharmaceutical formulation adapted for the treatment of patients with insufficient neutrophil levels comprising a heterologous fusion protein of Claim 117.